

CHAPTER I

INTRODUCTION

1.1. General Background

Building is one of the human work that is based on combination between theories of science to design it and art to get its aesthetics side. Generally all buildings whether they are simple or complex such as high rise buildings are formed by frame series and each frame consist of beams and columns. Buildings are supported on hard soil through foundation. The buildings can be divided into upper and substructures. Upper structure consist of slabs, beams, and columns, while substructure consist of foundations.

Structural design is very important in building construction project in order to achieve safe and economical buildings that satisfy building codes. Building codes is a government standard in structure design where it gives and sets limitation in structure design in order to designed buildings are safe. Each country have building codes and it is different with other country, for example Indonesian Building Codes among of them are Indonesian Loading Code (PPI 1987), Indonesian Concrete Code (SNI – 03 – 2847 – 2002), and Indonesian Earthquake Code (SNI – 03 – 1726 – 2002).

The building will be designed is Cibubur Apartment in Jakarta, which is used for settlement. The building has seventeen story and it is made of reinforced concrete with $f_c' = 30$ Mpa, $f_y = 240$ Mpa for diametre of reinforcement bar less

than 12 mm, and $f_y = 400$ MPa for diameter of reinforcement bar is 12 mm or bigger. Based on the function and location of the building, it is considered that the building will be designed as a ductile structure with the ductility level is fully ductility. The building system is Moment Resisting Frame (MRF) as shown in figure 1.1. In this final project the building will be redesigned as SMRF (Special Moment Resisting Frame) where the properties of the original building is resized.

1.2. Problem Statement

Problem statement of this thesis is to design reinforced concrete structural elements such as beams, columns, and slabs, so they are be able to resist gravity loading according to Indonesian Loading Code (PPI 1987) and earthquake loading according to Indonesian Earthquake Code (SNI – 03 – 1726 – 2002).

1.3. Limitations

1. The structure which will be analyzed is 17 story building,
2. The structural members that will be designed are the beams and columns,
3. The structural elements will be designed as Special Moment Resisting Frame (SMRF),
4. The structure is located on earthquake zone 3 where the soil type is medium soil,
5. The program used for structural analysis is ETABS Non linier v 9.07,
6. The material specification:
 - a. Concrete with $f'_c = 30$ MPa

b. Reinforcement with:

$$f_y = 240 \text{ MPa for diameter} \leq 12 \text{ mm}$$

$$f_y = 400 \text{ MPa for diameter} > 12 \text{ mm}$$

1.4. Objective

The objective of this thesis is to redesign Cibubur Apartment based on buildings codes. The loading applied on building is based on Indonesian Loading Code, PPI 1987. Structural analysis will be done by using ETABS v. 9.07. Earthquake loading is designed according to Indonesian Earthquake code, SNI 03 – 2726 – 2002. In earthquake analysis, dynamic analysis as static analysis is done. The dynamic analysis is used to combine the level of base shear that should be applied to the structure while static analysis is used to distribute the earthquake loading such that the internal forces may have positive and negative sign. Dynamic analysis is done by using CQC (Complete Quadratic Combination) method to obtain the base shear of the building. Structural elements are designed according to SNI 03 – 2847 – 2002.

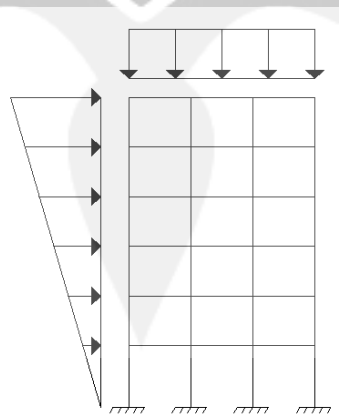


Figure 1.1 – Special Moment Resisting Frame (SMRF)